

agenda; or if he cannot prevent their being discussed together by East, it is in his interest to turn each game over to a different agent whose compensation depends only on the outcome of his own game. If North can force game 6 to be played first, and is unable to commit himself in response to a threat, the threat is obviated. If he can commit his choice in game 5 before the threat is made, he is safe. But if he can commit himself in game 5, and game 6 is to be played first, East could threaten to choose β in game 6 unless North assumed a prior commitment to A in game 5; in this case North's ability to commit himself is a disadvantage, since it permits him to be forced into "playing" game 5 ahead of 6.

Incidentally, dropping AB vertically in Fig. 2 to below the level $\alpha\beta$ would illustrate an important principle, namely, that moving one point in a manner "unfavorable" to North may actually improve the outcome for him. The threat that kept him from winning in Fig. 2 depends on the comparative attractiveness of AB over $\alpha\beta$ for North; if AB is made worse for him than $\alpha\beta$ he becomes immune to the threat, which then is not made, and he wins at $\alpha\beta$. This is an abstract example of the principle that, in bargaining, weakness may be strength.

3

BARGAINING, COMMUNICATION, AND LIMITED WAR

Limited war requires limits; so do strategic maneuvers if they are to be stabilized short of war. But limits require agreement or at least some kind of mutual recognition and acquiescence. And agreement on limits is difficult to reach, not only because of the uncertainties and the acute divergence of interests but because negotiation is severely inhibited both during war and before it begins and because communication becomes difficult between adversaries in time of war. Furthermore, it may seem to the advantage of one side to avoid agreement on limits, in order to enhance the other's fear of war; or one side or both may fear that even a show of willingness to negotiate will be interpreted as excessive eagerness.

The study of tacit bargaining—bargaining in which communication is incomplete or impossible—assumes importance, therefore, in connection with limited war, or, for that matter, with limited competition, jurisdictional maneuvers, jockeying in a traffic jam, or getting along with a neighbor that one does not speak to. The problem is to develop a *modus vivendi* when one or both parties either cannot or will not negotiate explicitly or when neither would trust the other with respect to any agreement explicitly reached. The present chapter will examine some of the concepts and principles that seem to underlie tacit bargaining and will attempt to draw a few illustrative conclusions about the problem of limited war or analogous situations. It will also suggest that these same principles may often provide a powerful clue to understanding even the logically dissimilar case of explicit bargaining with full communication and enforcement.

54 ELEMENTS OF A THEORY OF STRATEGY

The most interesting situations and the most important are those in which there is a conflict of interest between the parties involved. But it is instructive to begin with the special simplified case in which two or more parties have identical interests and face the problem not of reconciling interests but only of coordinating their actions for their mutual benefit, when communication is impossible. This special case brings out clearly the principle that will then serve to solve the problem of tacit "bargaining" over conflicting preferences.

TACIT COORDINATION (COMMON INTERESTS)

When a man loses his wife in a department store without any prior understanding on where to meet if they get separated, the chances are good that they will find each other. It is likely that each will think of some obvious place to meet, so obvious that each will be sure that the other is sure that it is "obvious" to both of them. One does not simply predict where the other will go, since the other will go where he predicts the first to go, which is wherever the first predicts the second to predict the first to go, and so ad infinitum. Not "What would I do if I were she?" but "What would I do if I were she wondering what she would do if she were I wondering what I would do if I were she . . . ?" What is necessary is to coordinate predictions, to read the same message in the common situation, to identify the one course of action that their expectations of each other can converge on. They must "mutually recognize" some unique signal that coordinates their expectations of each other. We cannot be sure they will meet, nor would all couples read the same signal; but the chances are certainly a great deal better than if they pursued a random course of search.

The reader may try the problem himself with the adjoining map (Fig. 7). Two people parachute unexpectedly into the area shown, each with a map and knowing the other has one, but neither knowing where the other has dropped nor able to communicate directly. They must get together quickly to be rescued. Can they study their maps and "coordinate" their behavior? Does the map suggest some particular meeting place so unambiguously

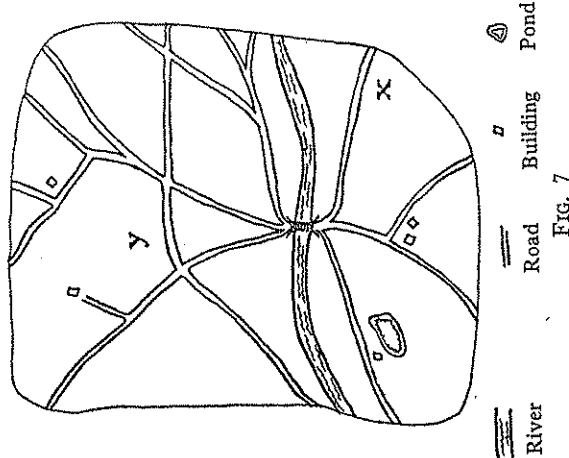


FIG. 7

that each will be confident that the other reads the same suggestion with confidence?

The writer has tried this and other analogous problems on an unscientific sample of respondents; and the conclusion is that people often can coordinate. The following abstract puzzles are typical of those that can be "solved" by a substantial proportion of those who try. The solutions are, of course, arbitrary to this extent: any solution is "correct" if enough people think so. The reader may wish to confirm his ability to concert in the following problems with those whose scores are given in a footnote.¹

¹ In the writer's sample, 36 persons concerted on "heads" in problem 1, and only 6 chose "tails." In problem 2, the first three numbers were given 37 votes out of a total of 41; the number 7 led 100 by a slight margin, with 13 in third place. The upper left corner in problem 3 received 24 votes out of a total of 41, and all but 3 of the remainder were distributed in the same diagonal line. Problem 4, which may reflect the location of the sample in New Haven, Connecticut, showed an absolute majority managing to get together at Grand Central Station (information booth), and virtually all of them succeeded in meeting at 12 noon. Problem 6 showed a variety of answers, but two-fifths of all persons succeeded in concerting on the number 1; and in problem 7, out of 41 people, 12 got together on \$1,000,000, and only 3 entries consisted of numbers that were not a power of 10; of those 3, 2 were \$64 and, in the

Your partner is to divide another \$100 into two piles labeled A and B. If you allot the same amounts to A and B, respectively, that your partner does, each of you gets \$100; if your amounts differ from his, neither of you gets anything.

9. On the first ballot, candidates polled as follows:

Smith	19	Robinson	29
Jones	28	White	9
Brown	15		

The second ballot is about to be taken. You have no interest in the outcome, except that you will be rewarded if someone gets a majority on the second ballot and you vote for the one who does. Similarly, all voters are interested only in voting with the majority, and everybody knows that this is everybody's interest. For whom do you vote on the second ballot?

These problems are artificial, but they illustrate the point. People *can* often concert their intentions or expectations with others if each knows that the other is trying to do the same. Most situations — perhaps every situation for people who are practiced at this kind of game — provide some clue for coordinating behavior, some focal point for each person's expectation of what the other expects him to expect to be expected to do. Finding the key, or rather finding *a* key — any key that is mutually recognized as the key becomes *the* key — may depend on imagination more than on logic; it may depend on analogy, precedent, accidental arrangement, symmetry, aesthetic or geometric configuration, casuistic reasoning, and who the parties are and what they know about each other. Whimsy may send the man and his wife to the "lost and found"; or logic may lead each to reflect and to expect the other to reflect on where they would have agreed to meet if they had had a prior agreement to cover the contingency. It is not being asserted that they will always find an obvious answer to the question; but the chances of their doing so are ever so much greater than the bare logic of abstract random probabilities would ever suggest.

A prime characteristic of most of these "solutions" to the problems, that is, of the clues or coordinators or focal points, is some kind of prominence or conspicuousness. But it is a promi-

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1. Name "heads" or "tails." If you and your partner name the same, you both win a prize.

2. Circle one of the numbers listed in the line below. You win if you all succeed in circling the same number.

7 100 13 261 99 555

3. Put a check mark in one of the sixteen squares. You win if you all succeed in checking the same square.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. You are to meet somebody in New York City. You have not been instructed where to meet; you have no prior understanding with the person on where to meet; and you cannot communicate with each other. You are simply told that you will have to guess where to meet and that he is being told the same thing and that you will just have to try to make your guesses coincide.

5. You were told the date but not the hour of the meeting in No. 4; the two of you must guess the exact minute of the day for meeting. At what time will you appear at the meeting place that you elected in No. 4?

6. Write some positive number. If you all write the same number, you win.

7. Name an amount of money. If you all name the same amount, you can have as much as you named.

8. You are to divide \$100 into two piles, labeled A and B.

more up-to-date version, \$64,000! Problem 8 caused no difficulty to 36 out of 41, who split the total fifty-fifty. Problem 9 secured a majority of 20 out of 22 for Robinson. An alternative formulation of it, in which Jones and Robinson were tied on the first ballot at 28 votes each, was intended by the author to demonstrate the difficulty of concentering in case of tie; but the respondents surmounted the difficulty and gave Jones 16 out of 18 votes (apparently on the basis of Jones's earlier position on the list), proving the main point but overwhelming the subsidiary point in the process. In the map most nearly like the one reproduced here (Fig. 1), 7 out of 8 respondents managed to meet at the bridge.

nence that depends on time and place and who the people are. Ordinary folk lost on a plane circular area may naturally go to the center to meet each other; but only one versed in mathematics would "naturally" expect to meet his partner at the center of gravity of an irregularly shaped area. Equally essential is some kind of uniqueness; the man and his wife cannot meet at the "lost and found" if the store has several. The writer's experiments with alternative maps indicated clearly that a map with many houses and a single crossroads sends people to the crossroads, while one with many crossroads and a single house sends most of them to the house. Partly this may reflect only that uniqueness conveys prominence; but it may be more important that uniqueness avoids ambiguity. Houses may be intrinsically more prominent than anything else on the map; but if there are three of them, none more prominent than the others, there is but one chance in three of meeting at a house, and the recognition of this fact may lead to the rejection of houses as the "clue."²

But in the final analysis we are dealing with imagination as much as with logic; and the logic itself is of a fairly casuistic kind. Poets may do better than logicians at this game, which is perhaps more like "puns and anagrams" than like chess. Logic helps — the large plurality accorded to the number 1 in problem 6 seems to rest on logic — but usually not until imagination has selected some clue to work on from among the concrete details of the situation.

TACIT BARGAINING (DIVERGENT INTERESTS)

A conflict of interest enters our problem if the parachutists dislike walking. With communication, which is not allowed in our problem, they would have argued or bargained over where to meet, each favoring a spot close to himself or a resting place particularly to his liking. In the absence of communication, their overriding interest is to concert ideas; and if a particular spot

² That this would be "correct" reasoning, incidentally, is suggested by one of the author's map experiments. On a map with a single house and many crossroads, the eleven people who chose the house all met, while the four who chose crossroads all chose different crossroads and did not even meet one another.

commands attention as the "obvious" place to meet, the winner of the bargain is simply the one who happens to be closer to it. Even if the one who is farthest from the focal point knows that he is, he cannot withhold his acquiescence and argue for a fairer division of the walking; the "proposal" for the bargain that is provided by the map itself — if, in fact, it provides one — is the only extant offer; and without communication, there is no counter-proposal that can be made. The conflict gets reconciled — or perhaps we should say ignored — as a by-product of the dominant need for coordination.

"Win" and "lose" may not be quite accurate, since both may lose by comparison with what they could have agreed on through communication. If the two are actually close together and far from the lone house on the map, they might have eliminated the long walk to the house if they could have identified their locations and concerted explicitly on a place to meet between them. Or it may be that one "wins" while the other loses more than the first wins: if both are on the same side of the house and walk to it, they walk together a greater distance than they needed to, but the closer one may still have come off better than if he had had to argue it out with the other.

This last case illustrates that it may be to the advantage of one to be unable to communicate. There is room here for a motive to destroy communication or to refuse to collaborate in advance on a method of meeting if one is aware of his advantage and confident of the "solution" he foresees. In one variant of the writer's test, A knew where B was, but B had no idea where A was (and each knew how much the other knew). Most of the recipients of the B-type questionnaire smugly sat tight, enjoying their ignorance, while virtually all the A-questionnaire respondents grimly acknowledged the inevitable and walked all the way to B. Better still may be to have the power to send but not to receive messages: if one can announce his position and state that his transmitter works but not his receiver, saying that he will wait where he is until the other arrives, the latter has no choice. He can make no effective counteroffer, since no counteroffer could be heard.³

³ This is an instance of the general paradox, illustrated at length in Chap-